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Memoirs of the Department of Agriculture in India.

GOSSYPIUM OBTUSIFOLIUM, ROXBURGH.

BY

I. H. BURKILL, M.A.,

Officiating Reporter on Economic Products to the Government of India.

AGRICULTURAL RESEARCH INSTITUTE, PUSA.

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GOSSYPIUM OBTUSIFOLIUM, ROXBURGH.

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In the herbarium of the Royal Botanic Gardens, Shibpur, and in the herbarium at Saharanpur, are preserved type-specimens of Roxburgh's *Gossypium obtusifolium*, and at Shibpur again is a drawing, made under Roxburgh's supervision, undoubtedly from the same plant or one of the same set of plants as furnished the specimens. These plants—however few or many, we do not know—were grown by Roxburgh from seed which he says came from Ceylon, "but not cultivated" there. They flowered, he adds, during the rains and cold season at Calcutta.

The description which he gives is not quite adequate for the definition of a cotton. It runs thus :—"Shrubby, very ramous. Leaves small, with three, rarely five, obtuse, ovate, entire lobes. Stipules falcate. The exterior calyx with entire divisions. Capsules ovate ; cells three-seeded. Seeds free and clothed with finely adhering short greenish-gray down under a small portion of ash-coloured wool."

In 1839 Forbes Royle in his *Illustrations of Himalayan Botany*, p. 98, followed Roxburgh, and kept *G. obtusifolium* as a separate species. The cottons that he had studied did not include it ; he did not criticise, nor offer any new observations, nor figure it.

In 1840 Wight thought that he recognised Roxburgh's *G. obtusifolium* in a plant which he figured in his *Icones Plantarum Indiæ Orientalis*, vol. 1, plate 9/198, under the name of "Gossypium herbaceum, Linn.—G. album, Ham. : Wight and Arnott :" (see the remarks on the page headed 'no. 1, explanation of plates', of Wight's book). The Royal Botanic Gardens, Shibpur, has a type specimen of this

plate; and I find it to be red-flowered, whereas *G. obtusifolium*, Roxb., is yellow-flowered. Wight in 1842 was appointed a Superintendent of cotton-plantations at Coimbatore, where now-a-days the race Nadam, which I shall refer to *G. obtusifolium*, is centred; but the appointment was two years after the issue of the part of the Icones containing the plates of cottons.

Royle in his book *On the Culture and Commerce of Cotton in India* (London, 1851), p. 144, called the wild cotton of Scind *Gossypium obtusifolium*, and Dalzell and Gibson (The Bombay Flora, Bombay, 1861, p. 21,) did the same. Royle, however, recognised differences. Dr. Maxwell Masters in 1874, in Hooker's *Flora of British India*, showed these authors to be wrong in so applying the name.

Cotton no. 3.

In 1864 Todaro published his *Osservazione sui Cotoni* in the *Giornali del Reale Istituto d' Incoraggiamento in Sicilia*, 3rd series, 1. pt. 3, p. 33, which was followed by Parlatore's *Le Specei dei Cotoni* (Florence, 1866), and again by Todaro's larger work—*Relazione sulla Cultura dei Cotoni in Italia seguita da una Monografia del genere Gossypium* (Rome, 1877-1878). We find in the first and last of these Italian works, *i.e.*, Todaro's, that *Gossypium obtusifolium*, Roxb., is maintained as a species, not exactly from knowledge of the plant that Roxburgh grew and described imperfectly, but from caution; whereas in the second work—Parlatore's—*Gossypium obtusifolium*, Roxb., is reduced to *Gossypium herbaceum*. Todaro points out in his *Monografia*, p. 129, that by Roxburgh's description the plant is different from *G. herbaceum* to which Parlatore would reduce it and from E. *wightianum*, a creation of Todaro's, to which he considers Wight's *G. obtusifolium* of plate 9/198 to belong,—as well as from *G. micranthum*, to which Sprengel had united it. The entire bracts and the three-seeded cells of the capsule seemed to him so good a characteristic as to serve to separate it from all other described cottons. He had not seen the type, and of all the material that had passed under his eyes one sheet only—a specimen collected by Zollinger in Java, no. 2782,—seemed to be referable to it.

Cotton no. 4.

Parlatore, on the other hand, remarked (p. 13) that he regarded *G. obtusifolium* as the wild form of *G. herbaceum*. He did not wish to make an elaborate classification; all our Indian species were in his eyes either to be called *G. herbaceum* or *G. arboreum*: he had at least separated the red-flowered cottons from the yellow-flowered and that seemed enough.

Masters in 1874 (Hooker's *Flora of British India*, vol. 1, p. 346) followed Parlatore in putting all the indigenous Indian cottons with yellow flowers into *G. herbaceum*, and all those with red flowers into *G. arboreum*. *G. herbaceum* was sub-divided by him into varieties, variety No. 1—var. *obtusifolium*, M. T. Masters,—being intended to be *G. obtusifolium*, Roxb. "This is the form found in Ava* by Griffith, Journals, p. 147," he says, and distributed under Wallich's Catalogue number 1880, together with a cotton from Martaban.

Cotton no. 5.

In the herbarium of the Royal Botanic Gardens, Shibpur, is a specimen from Martaban (*i.e.*, part of the no. 1880), and it proves to be the cotton there cultivated on *kain* † lands as described from Sir Dietrich Brandis in my report on Cotton in Burma (see Gammie, The Indian Cottons, Calcutta, 1905, p. 16); but there is at Shibpur no specimen from the Irrawaddy, and therefore I do not positively know what *G. herbaceum*, var., *obtusifolium*, M. T. Masters, is. It can most satisfactorily be ascertained by examination of the material at Kew; and the first race that it should be compared with is the Burmese Wa-gyi (or big cotton), and if not Wa-gyi it should be compared with the Burmese race Wa-gale (or little cotton); but Griffth's remark that the shrub was 6-8 feet high makes Wa-gyi the more probable.

Sir George Watt and Dr. J. Murray in the former's *Dictionary of the Economic Products of India*, article Gossypium, para. G. 407, name a race of cotton as *G. herbaceum*, var. *obtusifolium*. Thanks to the explicitness of the Dictionary, it is

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* At Yenangyaung, Magwe District.

† Lands periodically flooded.

easy to fix the types of this name. They are Masters' type collected by Griffith on the banks of the Irrawaddy, and a plant collected by Sir George Watt on the Manipur boundary. The race to which the latter plant belongs is known to me not only from Sir. George Watt's no. 5824, but also from a plant at Shibpur labelled as collected in the Mikir hills in 1845. The colour of the flower is yellow, but in both specimens it has dried to a claret red, with the margins of the petals, which have been exposed in the bud, velvety and of a bronze-green shade. Sir George Watt's specimens, which have root and stem complete, show a plant scarcely a foot high, and in his notes on the labels he gives the plants as not exceeding two feet in height. The Mikir hills plant, I should think, has not been tall: the stems are stout for the size of the plant, the leaves very small, the bracts under the flowers entire, and the short branches that are present are nearly horizontal and stiff in aspect. This Manipur-Mikir cotton seems to me to be a race closely allied to the Burmese Wa-gale and not to the Burmese Wa-gyi.

Cotton no. 6.

After writing of the plants just referred to, Sir George Watt and Dr. Murray continued, "Samples have also been obtained from Madras of a plant with small and mostly three-lobed leaves, which appear to be the obtuse-leaved cotton of most writers, and we have grounds for believing that the plant we allude to at least is fairly extensively cultivated throughout India especially in the warmer areas and on poorer soils." I am not able to say with certainty what this cotton is, but I suspect that the race Nadam from Coimbatore is referred to, as the plant from Madras.

Cotton no. 7.

Professor Middleton, writing in the Agricultural Ledger, 1895, no. 8, did not mention *Gossypium obtusifolium* by any latin name.

In 1903. Dr. Angelo Aliotta published a *Revista critica del Genere Gossypium* (Portici). He is a follower of Parlatore, and *G. obtusifolium* (but with a query) is reduced to *G. herbaceum*. He writes (p. 67) a long note upon it, mentioning Todaro's, Parlatore's and Sir George Watt's and Dr. Murray's remarks.

Professor G. A. Gammie's *Indian Cottons* (Calcutta, 1905), is the last publication to be referred to. He recognises the species, quoting the following races as it :—

No. 8, Nadam of Madras, Coimbatore.
No. 9, Rozi of Gujarat.
No. 10, Coconada cotton.
No. 11, One set of Baluchistan plants.
No. 12, Two sets of Baluchistan plants.
No. 13, Wa-gyi, of Burma (including his so-called 'Wa-gale' from Natoggyi which was doubtless Wa-gyi, the wrong name having been communicated from that place, where both are grown).
No. 14, Shanghai and Wuhu cottons.
No. 15, Three sets from Scind.

These plants he classifies in varieties thus :—

Type, nos. 8 and 9.

Var. *Coconada*, with buff lint, nos. 10 and 11.

Var. *hirsutior*, more hairy and with a strong tendency towards his *G. herbaceum*, no. 12.

Var. *Nanking*, bolls and bracteoles large : plants with a tendency towards his* *G. neglectum*, nos. 13 and 14.

Var. *sindica*, branching more sparsely than in the type, upper branches with a stronger tendency to become successively shorter, plants with a tendency towards his* *G. indicum*, no. 15.

I have now to compare among themselves the plants enumerated as having been ascribed to *G. obtusifolium*, intending less to define the species than to decide which of them agree with the type plant.

Roxburgh's *G. obtusifolium* is a shrubby, much branched plant, presumedly perennial (triennial at least) : the branches as shown by the specimens ascending : they are not markedly zigzag, and are just covered with a coat of stellate hairs mixed with longer straight hairs. Leaves in outline as in the adjoined

* By the word 'his' the reader should anticipate no disagreement between my views and those published by Prof. Gammie : but the word is necessary in order that the reader may not misunderstand my remarks.

SPECIMENS CITED BY AUTHORS AS G. OBTUSIFOLIUM.

	No. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
By Roxburgh ..	Cult. at Shibpur.														
By Royle, 1839..	Ditto														
By Wight ..	....	A red-flowered cotton.													
By Royle, 1851..	Ditto	.. .	Wild Scind cotton.												
By Todaro ..	Ditto	....	....	Doubtfully Zollinger's No. 2782.											
By Parlatore ..	NOT KEPT IN ANY WAY DISTINCT FROM G. HERBACEUM.														
By Masters ..	....	....	....	....	Griffith in Wall. Cat. 1880, part.										
By Watt and Murray.	....	....	....	....	Ditto	Watt's Manipur, No. 5824.	Doubtfully a Madras race.								
By Aliotta ..	NOT KEPT DISTINCT FROM G. HERBACEUM.														
By Gammie ..	.....	....	....	.....	....	....	....	Madras Nadam.	Gujarat Rozi.	Madras Coconada.	Baluchistan.	Baluchistan.	Burmese Wa-gyi.	Chinese plants.	Some Scind races.

diagram, which is of natural size, without small intercalated lobes in that larger sinus,* and not full there, with a fine down on the main veins above, and to some small extent on the surface between them, below with more abundant hairs on the veins and with stellate hairs between: petiole about as long as the blade: stipules lanceolate-falcate. Flowers often terminating a side branch of two internodes (hence the expression pedicels jointed in the middle), and generally furnished at the node last below the flower with a small leaf having the lobes obscure or sometimes absent: bracts under the flower broadly ovate, short, as drawn with one or more small teeth (not entire necessarily as Roxburgh's description would imply). Calyx forming a nearly even ring. Corolla conspicuously thrust out from the bracts, represented as yellow, presumedly blotched inside at the base, but this is not ascertainable. Capsules ovate, very small, drawn out into a point above, three-celled with (about†) three seeds in each cell; the seeds 5-5·5 mm. long with a little very soft white wool on them and covered by greenish gray fuzz, not beaked.

Now I proceed to note on the various examples assigned later to *G. obtusifolium*.

Cotton no. 2 above does not agree with the type; it has red flowers and differs in other ways: it is therefore to be excluded from *G. obtusifolium*. Cotton no. 3 differs very greatly in the bracts which are large with very long teeth, as well as in other characters, and cannot be called *G. obtusifolium*. Cotton no. 6 seems to me to be distinct from our plant: it ought to be grown in good cultivated land by the side of other Indian cottons and thoroughly studied: by doing this any characters which have been more or less dwarfed out of it by starvation will declare themselves and enable a student of the cottons to determine what it is.

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*The Martaban half of Wallich's no. 1880 has these intercalated lobes.

† See p. 24 of Gammie's Indian Cottons for a remark showing how, in the case of the race *Bani*, the number of the seeds in each cell may vary from three to seven.

Cotton no. 4, I cannot write about, as I have not seen the specimen. Cotton no. 5 may be the same as cotton no. 13: if it is, I am satisfied to call it *G. obtusifolium*. Cotton no. 7 may be the same as cotton no. 8, and if so, I am satisfied to call it also *G. obtusifolium*.

There is no cotton that I have seen more like Roxburgh's type than are specimens of Nadam, cotton no. 8. I have studied it at Poona and at Shibpur and in abundant specimens supplied to me from Coimbatore, and I find that when Nadam is old and becoming worn out it forms leaves and bracts and well thrust-out flowers which are extremely like those of Roxburgh's type; and perhaps if one searched long enough one could obtain capsules as small as those of the type and as few-seeded, instead of having 6-8 seeds to each cell. There is then this difference between Roxburgh's plant and Nadam, that Nadam is like an improved state of the type. Or are we to say that the type is like what one could believe a degenerate Nadam to become? At any rate it is quite reasonable to regard the two as having this kind of relationship to each other. The type is said to have been raised from seeds of a plant wild in Ceylon; the race Nadam comes from the southern parts of India, between which and Ceylon there is a considerable amount of traffic. But there is this to add that the type flowered at Shibpur in the rains and cold weather, while Nadam begins to flower at Shibpur six weeks before the commencement of the rains; Nadam does not fall off in its second year; and at Shibpur after 18 months' growth, its stems have reached ten feet in length. Along with Nadam is certainly to be classed the Gujarat race Rozi. When grown by the side of Nadam at Poona, it began by being a very little less vigorous, but it does not otherwise differ in any feature easily noted. Middleton, in the *Agricultural Ledger*, 1895, no. 8, p. 8 (p. 108 of the volume for the year), and Gammie have indicated how the two plants must be placed together. Like Nadam then it differs from Roxburgh's plant in its larger bracts, larger capsule and beaked seeds, but when getting towards the end of its time and becoming worn out, Rozi, like Nadam, may produce entire

bracts at least not larger than the bract of *G. obtusifolium*, type, as Roxburgh draws it. We do not know how long Rozi has been grown in Gujarat, but a century and a quarter ago it was not Rozi but a red-flowered cotton that Hove—the cotton specialist of that time—found to be the perennial cotton crop of the country towards Cambay.

Cotton no. 10, Coconada, always seems to me to have differences, very hard to put down on paper, which, beyond the colour of the lint, separate it from Nadam ; but it is as good a representative of *G. obtusifolium* as Nadam. Of cotton no. 13, Wa-gyi, it may be briefly said that it is quite a good representative also.

I do not feel to know enough yet about the Baluchistan races and the Chinese races which make nos. 11, 12 and 14. The Chinese races were grown from seed kindly sent to me by Mr. A. R. Burkill of Shanghai, and in growing very badly they exactly illustrated the difficulty known almost invariably to beset one in the attempt to acclimatise strange cottons.

The cottons of Scind referred to as no. 15 differ rather more than the others from Roxburgh's type.

In conclusion, it may be said that an examination of Roxburgh's type is enough to satisfy me that what we in India are calling *Gossypium obtusifolium*, Roxb., is quite justifiably so-called, but that the exact race which Roxburgh grew is not any race that has been grown in the recent experiments in India, nor is it represented in the collections accessible to me except in the type.

Explanation of Plate.

Fig. 1. Flower faithfully copied from Roxburgh's drawing.

„ 2. Three-lobed leaf, from one of the specimens, exact size.

„ 3 and 4. Bracts from the specimens, exact size.

„ 5. Capsule from Roxburgh's drawing, exactly reproduced.

„ 6. Diagram of branching of a young plant of *Nadam*.

Gossypium Obtusifolium Roxb.

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